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December 28, 2018

Ann Farr, SEPA Responsible Official
Port of Kalama
110 W. Marine Drive
Kalama, WA 98625

Dr. Elaine Placido, Director
Cowlitz County Planning and Community Development
207 4th Avenue North
Kelso, WA 98626

RE: Comments on Draft Supplemental Environmental Impact Statement

Dear Ann Farr and Dr. Elaine Placido:

Thank you for opportunity to comment on the Draft Supplemental Environmental Impact Statement (Draft SEIS) for the Kalama Manufacturing and Marine Export Facility (KMMEF) located in unincorporated Cowlitz County and proposed by Northwest Innovation Works, LLC (NWIW) and the Port of Kalama. The Draft SEIS supplements the Final Environmental Impact Statement published by the SEPA co-lead agencies on September 30, 2016 with additional analysis and consideration of mitigation for greenhouse gas emissions attributable to the project.

The Department of Ecology (Ecology) has reviewed the Draft SEIS and provides questions, comments, and suggestions. Our feedback focuses on three main categories:

1) proposed mitigation package
2) production alternatives addressed in the Draft SEIS's sensitivity analysis
3) assumptions and methodologies generally employed in the lifecycle analysis

Please feel free to contact us with questions about these comments or if you would like our assistance on any of these issues, particularly mitigation.

MITIGATION

Ecology provides the following questions and comments on the mitigation package described on page 3-31 of the Draft SEIS. All parties will benefit if mitigation conditions are clear, verifiable, enforceable, and result in real emissions reductions.

Scope

Ecology understands that NWIW proposes to mitigate 100% of all direct and indirect greenhouse gas emissions resulting from this project in Washington on a lifecycle basis, and that this mitigation would be memorialized in some type of binding agreement. We recommend that the the Final SEIS address whether the mitigation package will cover increases in greenhouse gas emissions in Washington that result from development facilitated by the infrastructure built to support the project. We recommend the Final SEIS further clarify if mitigation agreements would cover actual greenhouse gas emissions in Washington state, not potential or projected emissions. Additionally, we recommend any final mitigation agreement list all known included greenhouse gas emissions, as well as the types of emissions expected to be covered if greenhouse gas accounting methods and/or emissions in Washington change over the 40+ year life of this project.

Ecology anticipates the following types of greenhouse gas emissions would be covered by this agreement. This list is not intended to be complete. We would be glad to serve as a resource with parties to further scope the types of emissions covered by the agreement. Please confirm, correct, or expand upon this list as appropriate within the Final SEIS.

- Direct operation emissions
    - Onsite emissions covered under WAC 173-441 (Reporting of Emissions of Greenhouse Gases)
    - Onsite combustion, process, and fugitive emissions not covered under WAC 173-441
        - Mobile sources (forklifts, maintenance equipment, etc.)
        - Emergency generators
        - HVAC and refrigeration systems
        - Other chemical processes
        - Non-included equipment leaks
        - Waste and wastewater
        - Accidental spills, accidents, or releases
        - Research and development

- Emissions from project construction
    - Construction equipment
    - Mobile sources, both onsite and transportation of people and materials to and from the site
    - Embodied emissions in equipment
        - Several of the listed materials (such as rebar, asphalt, cement, etc.) are produced in Washington. Therefore, it would be appropriate to mitigate emissions from those materials as they are either Washington sourced or are sourced from out of state with greater transportation emissions.
    - Waste

- Emissions related to natural gas transmission and distribution within Washington

  - Losses in interstate transmission system
  - Losses in local distribution system or spur lines
  - Compressor stations and other energy sources used to move natural gas
  - Storage losses
  - In state extraction or processing (if such activities occur in the future)

- All transportation emissions in Washington during operation and construction
  - Vessels, boats, and support equipment in Washington waters
  - On-road and off-road vehicles transporting people or cargo in Washington
  - Prorated emissions from any rail or air traffic used to transport people or cargo in Washington

- Emissions associated with purchased electricity

- Lifecycle emissions in Washington associated with purchased or used products and generated wastes

- Greenhouse gases listed in WAC 173-441-040 for all emissions sources

Emissions measurement methods
The proposed mitigation would be most successful if direct and indirect emissions related to this project are quantified as accurately as possible. Like the scope of covered emissions, this should be both specific for emissions sources known at the time of the agreement and general enough to adapt to changing quantification methods and emissions types over a 40+ year time period. Ecology offers assistance as a resource in developing an emissions measurement plan.

We recommend emissions be quantified using the following preferences:

1. Actual measured emissions values
2. Directly measured activity data in conjunction with the most current version of relevant greenhouse gas accounting regulations (WAC 173-441 or 40 CFR Part 98)
3. Measured activity data using another approved calculation method
   a. The types of methods should be described in the agreement and could potentially include:
      i. other final regulations from other jurisdictions or primarily used for other purposes,
      ii. proposed regulations,
      iii. voluntary GHG calculation protocols,
      iv. industry best practices, or
      v. other sources.
4. Estimates based on company data, published reports, or government information

Eligible mitigation methods
The Draft SEIS lists mitigation through "The purchase of verified carbon credits through carbon credit markets or banks; or the payment of an amount comparable to No. 1 above into a GHG

mitigation fund." We recommend adding details on this requirement to support more successful mitigation. Again, Ecology offers assistance as a resource in this area.

We have the following questions about this section and recommend the Final SEIS provides additional information addressing:

- Which specific markets do you intend to access?
- Who approves the markets or funds?
- What process or criteria are used to approve new markets or funds necessary to adapt over the 40+ year life of this project?
- If a mitigation fund is used, who implements it, and how?
- Is mitigation conducted on a 1:1 ratio per metric ton CO_2e?
- Are there restrictions to the type of mitigation projects? For example, is sequestration allowed or only reduction projects? Are there geographic or time restrictions?

Ecology is under the impression that the rationale for limiting this mitigation package to emissions in Washington state is to prevent the project from adversely impacting the state's progress towards the greenhouse gas reduction targets in RCW 70.235 (Limiting Greenhouse Gas Emissions).[1] Is this correct? If so, we make the following suggestions:

- Limit mitigation to projects in Washington
- Limit mitigation types to those that cover emissions included in Washington's Greenhouse Gas Inventory
    - The Inventory is the tool used to measure progress towards Washington's targets, so any emissions not included in the inventory would not count. CO_2 emissions from woody biomass are not included in the inventory because they are not considered greenhouse gases under Washington law (RCW 70.235.020(3)). Therefore, sequestration projects, particularly forestry projects, may not fit this goal.

Agreement oversight and timing

As mentioned above, the details of this agreement could likely change over the projected 40+ year life span of the facility. New emissions will need to be accounted for and calculation methodologies updated. With that in mind, we have the following questions regarding a mitigation agreement and recommend clarifying the questions in the Final SEIS:

- Who is responsible for the oversight of this agreement now and in the future to ensure the mitigation is real, permanent, enforceable, verifiable, and additional?
- Who verifies the accuracy of the emissions reports?
- Is there a public process for any changes or determinations?
- How would adjustments be made if over or under reporting or mitigation is discovered at a later date?

[1] Draft SEIS page 3-25

- How do the applicants propose to make the mitigation a legally binding requirement for the next 40+ years?
- What is the schedule for emissions calculation and mitigation?
    - Is it annual?
    - What are the due dates for each step?
    - The Draft SEIS states on page 3-31 that mitigation "emissions from project construction (as distributed over the project's 40-year life)" will be included. Why are construction emissions prorated in the mitigation plan? If prorated, describe how that would work.

Agreement off-ramp

The mitigation language includes the following provision that would allow NWIW to reduce or even cease mitigation under certain circumstances.

> *"NWIW's full GHG mitigation program will continue for the life of the proposed project, currently estimated to be 40 years, following commencement of operations or until there is a comparable national, state, or local programmatic, regulatory, or statutory framework for reducing and/or mitigating GHG emissions (including, for example, imposition of a carbon tax or GHG emission cap and/or reduction programs for industrial facilities) that directly applies to the proposed project and replaces some or all of the full mitigation level contemplated."*

Ecology understands that it is reasonable to allow NWIW to reduce its mitigation obligations commensurate with any reductions achieved under state or federal emissions reductions programs. However, Ecology recommends rewording this portion of the Draft SEIS to communicate this intent even more clearly. Questionable equivalence determinations or the inclusion of "replaces some or all" could result in a new policy that is weaker than the Draft SEIS's proposed mitigation package. This could result in fewer actual greenhouse gas reductions than covered in the agreement. We recommend that the final mitigation language include provisions that are stronger and more specific that support what Ecology understands to be the true intent of this language: that the off-ramp provisions are only intended to prevent double mitigation of emissions. In addition, Ecology has the following questions and recommends adding clarifications in the Final SEIS:

- Please confirm that the inclusion of "estimated to be 40 years" does not mean that mitigation will cease after 40 years if the facility continues to operate beyond that time.
- How is a "comparable national, state, or local programmatic, regulatory, or statutory framework for reducing and/or mitigating GHG emissions" defined?
    - What are the criteria for equivalence?
    - Who makes this determination?

PRODUCTION ALTERNATIVES ADDRESSED IN THE DRAFT SEIS'S SENSITIVITY ANALYSIS

One of the central points of the Draft SEIS is that the emissions displaced by this project are greater than the emissions created by the project, therefore the project is net greenhouse gas emissions negative on a global lifecycle basis. The lifecycle analysis uses a comparison between the project and a generic coal-to-methanol process to draw this conclusion (Figure S.1, etc.). The net negative emissions finding is used to conclude that the proposed project would not result in an unavoidable significant adverse impacts to greenhouse gas emissions or climate change (page 1-7).

Lifecycle analyses have many variables, calculation methods, values, and assumptions that go into the evaluation. The project proposes to use relatively new processes in a new location to supply a product to a defined market on another continent over at least four decades. This means any lifecycle analysis of this project must consider and address uncertainty.

One of the best ways to address this uncertainty is to analyze several different outcomes and variables in a robust sensitivity analysis. Sensitivity analyses should by definition use a variety of assumptions to create a range of possible outcomes that are inclusive of both the most optimistic and pessimistic possibilities. Scenarios should use expected and worst case assumptions, not just best case assumptions, to make the analysis as accurate and inclusive as possible.

To that end, for the Final SEIS we suggest preparing additional sensitivity analysis that includes several methanol production alternatives to get a broader range of possible outcomes. The project could then be compared to these outcomes to demonstrate if the project is net emitting, net emissions negative, or if the analysis is inconclusive.

Ecology believes that relying on a single methanol production alternative is insufficient to support the finding of "no unavoidable significant adverse impacts" to greenhouse gas emissions or climate change in this case. We recommend the Final SEIS evaluate other production alternatives in the sensitivity analysis before drawing a conclusion on significance. Additionally, we recommend the scenarios described in this section of the Final SEIS be more fully evaluated and included in the net impact analysis in addition to coal to methanol. Other options mentioned in the Draft SEIS (examples: coal / natural gas hybrid, coke, coal / ammonia, or possibly carbon capture) would seem appropriate to include in the Final SEIS.

Final end use product

One of the first steps in identifying reasonable alternatives scenarios is to identify the appropriate end product of the project. The Draft SEIS identifies methanol as the end product for this project. Other emissions related to methanol combustion may need to be calculated and included in more detail if this is the case. The Draft SEIS also contains information that suggests olefins may be a more appropriate comparison product.

Methanol is used for multiple purposes both globally and in China. Two of the more common uses are as an intermediate product in olefin production and as a fuel, either pure or blended, in stationary or mobile combustion sources. Figure 4.9 of the Draft SEIS shows that significant quantities of methanol are combusted in China, primarily in mobile sources, which the document argues are more polluting than stationary sources. The Draft SEIS states that methanol will only be used for olefin production. However, because there are no requirements for this use and consequently it seems reasonable to suggest and discuss in the Final SEIS that some methanol from this project could be used for mobile or stationary fuels at some point in the 40+ year lifespan of this project.

We recommend the Final SEIS fully evaluate both potential uses of methanol: as a fuel and for olefin production. Both potential final end products should be quantified and included in the final net emissions calculations. This could be represented in a figure such as Figure S.1 as additional bars in each column for olefin emissions and an additional column for methanol fuel use. It may be possible to exclude methanol as fuel from the analysis if a more robust demonstration of 100% use as olefins was provided, and methanol to olefin emissions were included. The Draft SEIS seems to present that the methanol as fuel pathway does not need to be fully explored because olefins are the final product, therefore olefin production emissions (including alternate ways of making olefins) should be included in the detailed net emissions scenarios.

It seems reasonable to end the analysis at the olefin stage, as there are many unforeseeable variables if trying to estimate lifecycle emissions related to the final plastic consumer products. This conclusion may need revisiting, however, if other non-olefin based methods of making the final consumer products are identified.

Naphtha to olefins

As discussed above, if olefins are considered the final product in this analysis then all methods of producing olefins should be addressed in this lifecycle analysis. Petroleum to olefin methods were discussed in the Draft SEIS, but were not calculated in detail or included in the sensitivity analysis. Page 66 of the Draft SEIS states that "naphtha has been and continues to be the predominant feedstock for Chinese olefin production." We recommend the predominant method of currently producing this end product for the specified market should be detailed in the lifecycle net greenhouse gas emissions analysis.

The Draft SEIS includes simplified estimates for greenhouse gas emissions from naphtha-to-olefin production. Table 5.12 compares the method with the project's estimated process and the coal-to-methanol process. Those estimates show greenhouse gas emissions from petroleum naphtha to be only slightly higher than the project's process (lifecycle emissions of 2.32 vs. 1.85-2.26 kg CO_2e / kg olefin). Page x of Appendix A of the Draft SEIS also states that "naphtha based olefin production has 10% higher GHG emissions than MTO derived from KMMEF sourced methanol." This difference is much less than the published difference between the project and the coal-to-methanol process and therefore provides a lower net benefit value than used in the Draft SEIS. Other studies have compared the project to the naphtha-to-olefin process

and show that the project can be the more emitting of the two processes.[2] Future comparison should consider assumptions and calculation methods to obtain reasonable and accurate results.

Natural gas to methanol to olefins

The naphtha-to-olefins process is the predominant current technology, but the Draft SEIS states that the natural gas-to-methanol-to-olefins process is one of the methods expected to have strong market share in the future. Therefore, it would be useful to include in the Final SEIS a detailed analysis of this process in the sensitivity analysis and net greenhouse gas emissions comparison of a 40+ year project.

Table 4.1 of the SEIS shows that natural gas is already the most prevalent method of methanol production globally, with coal based production mostly limited to China. Figures 4.15, 4.16, and 4.17 show the current supply curve for methanol delivered to China. The graphs show that coal-to-methanol plants are the most expensive option, a mixture of various technologies are around the demand line in both scenarios, and all of the most cost effective plants are natural gas-to-methanol plants. It seems reasonable to expect future construction to include, if not prefer, natural gas-to-methanol plants if they are already cheaper than coal-to-methanol plants. The graphs appear to account for transport and international markets as they show delivered costs to China. The project proposal also seems to suggest that Chinese organizations are interested in the international natural gas-to-methanol market.

Direct comparison with the project is possible since both processes converge on methanol as a product. However, we recommend all scenarios include emissions up to the olefin production stage to facilitate a unified comparison in the Final SEIS.

The project's lifecycle analysis

Ecology's comments on the details of the lifecycle analysis focus on a few main points. Absence of comments on other points should not be interpreted as either support or objections to that work. Overall, we emphasize earlier points that sensitivity analyses should use a variety of assumptions to create a range of possible outcomes, and the Final SEIS should use expected and worst case assumptions, not just best case assumptions, to support an analysis that is as accurate and inclusive as possible.

Upstream electric power

The Draft SEIS uses market mediated conditions for baseline scenarios in most cases in Table 6.1, but there are a few deviations. In each case the deviation results in a more favorable baseline value than the market condition.[3] The deviation for the project's upstream power is one

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[2] Erickson, P. and Lazarus, M. (2018). Towards a Climate Test for Industry: Assessing a Gas-Based Methanol Plant. Discussion brief. Stockholm Environment Institute. https://www.sei.org/publications/assessing-gas-methanol-plant/.

[3] Table 6.1 shows market mediated direct combustion emissions are 0.004 average annual GHG emissions (million tonne/annum) while baseline emissions are shown as 0.0004. It appears this is a mistake and all direct construction emissions should be the same value.

of the deviations. The market mediated case is listed in Table 2.3 as marginal power, 15% RPS while the baseline case is listed as a Washington state energy mix.

This project would require a large amount of electricity and create new demand. Therefore, Ecology recommends the Final SEIS analysis use current marginal power emissions factors that more accurately reflect the higher polluting resources that will be needed to meet this new demand.

Upstream natural gas

Greenhouse gas emissions from upstream natural gas extraction, processing, transmission, and distribution play an important role in the lifecycle analysis of this natural gas intensive project. These processes require significant energy, often in the form of combustion, and equipment at each step is prone to leaks. Since natural gas is primarily methane, a potent greenhouse gas, these leaks can result in large climate impacts.

Lifecycle emission factors for the natural gas sector, particularly for fugitive emissions, have high uncertainties. Also, new studies that improve emission estimates are frequently being published. Ecology recommends the Final SEIS use a wide variety of emission factor sources, including from recent studies, to perform a detailed sensitivity analysis on these emissions to address this uncertainty.[4] Leaks from all phases should be addressed, including: extraction, processing, transmission, and distribution. We recommend the full volume of natural gas used directly or indirectly by this project should be analyzed. Please see our earlier comments in the mitigation section of this letter for other natural gas related emissions types we recommend be included.

The Draft SEIS relies on the GREET and GHGenius models. Both models are focused on the transportation sector and may not be the most current or applicable to this industrial project. It is appropriate to include these models in the Draft SEIS, as part of a broader sensitivity analysis. Ecology recommends reviewing the studies referenced in the Stockholm Environment Institute as well as EPA's 40 CFR Part 98.

Page 27 of the Draft SEIS states that the project will "use the NWP interstate pipeline system to deliver its supply of natural gas. The pipeline draws over 99% of its gas from Canada and the balance from the Rocky Mountains... NWIW will be contracting and receiving Canadian natural gas, primarily from the Montney formation in British Columbia." It appears that the primary reason for the geographic distinction in the analysis is because GREET is used to calculate emissions for USA sourced natural gas and GHGenius is used for Canadian natural gas (page 45). This geographic proration of models further narrows the sensitivity analysis.

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[4] *See, e.g.*, Erickson, P. and Lazarus, M. (2018). Towards a Climate Test for Industry: Assessing a Gas-Based Methanol Plant. Discussion brief. Stockholm Environment Institute. https://www.sei.org/publications/assessing-gas-methanol-plant/.

Ecology believes the geographic distinction is less important in this case because, as the Draft SEIS points out on page 28, "most Canadian production growth is from horizontal wells and almost universally produced with subsurface fracturing." Specifically, the Montney formation is known as a basin that primarily extracts natural gas through hydraulic fracturing. Using a range of recent emissions factors for hydraulicly fractured natural gas is more important than focusing on if the gas comes from Canada or the United States. The distances traveled are similar and the common use of hydraulic fracturing overwhelms other geographic differences.

Climate Impacts

On page 3-3 the Draft SEIS discusses the work of UW's Climate Impact group, specifically the impact of the consequences of climate change. Yet the document does not discuss the impact of severe weather on transmission pipelines. The Pipeline and Hazardous Materials Safety Administration compilation of transmission incidents indicate that about 8% of incidents are related to severe weather events. The potential for incident related releases of greenhouse gas emissions during a 40 year project lifespan may be significant. Ecology recommends the Final SEIS evaluate and describe the impact of severe weather on natural gas transmissions lines.

Conclusion

Ecology recognizes and appreciates the Draft SEIS provides a great deal of additional greenhouse gas assessment and evaluation. Our comment letter provides feedback and suggestions to further strengthen the Final SEIS. In particular, we recommend mitigation conditions are further clarified to be as clear, verifiable, and enforceable as possible to facilitate real emission reductions. We suggest additional analyses are needed to contribute to the Final SEIS findings of significance. Detailing more production scenarios would also strengthen the analysis. All scenarios should use "expected" and "worst case" assumptions, not just "best case" assumptions, to make the analysis as accurate and inclusive as possible.

Please do not hesitate to contact Ben Blank at (360-407-7624) or by email at ben.blank@ecy.wa.gov or me at (360) 407-6307 or by email at sally.toteff@ecy.wa.gov if you have questions or if you would like additional assistance in the areas we commented on.

Best Regards,

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